Project Bluebook:

National Spatial Data Infrastructure Stewardship Guidance

Cadastral Data Theme

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Cadastral Data Theme

Overview

Cadastral data encompasses a wide range of spatial data entities that are fundamental to many GIS and cartographic applications. Cadastral data is normally considered a key element of base maps and serves as essential reference data in this context. Besides its role as reference data, cadastral data is at the core of applications such as land use management including land restrictions and use authorizations, tax rolls, and general purpose mapping.

Cadastral data is primarily collected at neighborhood scales using survey techniques. At the neighborhood level, the parcel is the primary mapping unit. City and county level representations are important to identify and distinguish city blocks and to highlight government and private lands. At regional levels, it is important to depict the national cadastral fabric and the surface management agency.

The specification for the Cadastral data theme has been guided by work done by the Federal Geographic Data Committee (FGDC) Cadastral Subcommittee. In particular, the specification draws from the subcommittee's Cadastral Core Data document (Version 7) published in June 2005. This specification was developed with the intent of defining the core elements of cadastral data collected at the local level that are of more general interest as described below (page 1):

> Cadastral Core Data is a minimum set of attributes about land parcels that is used for publication and distribution of cadastral information by cadastral data producers. The core data is intended to provide sufficient information to support integrating basic land parcel information across jurisdictional boundaries and answering fundamental questions for business processes that need cadastral information. Therefore, the Cadastral Core Data defines the minimum content for the Cadastral National Spatial Data Infrastructure (NSDI).
>
> The Cadastral Core Data will be extracted from parcel data producers at all levels of government but primarily local governments from real tax systems and federal agencies for federally held lands. Cadastral Core Data will be standardized so it can be integrated across jurisdictional boundaries, from county-to-county and from state-to-state.

The resulting set of proposed Cadastral Core Data is relatively limited. It consists of spatial reference information; cadastral reference consisting of corners, grid/cell reference, and hydrography; and parcels. The Bluebook cadastral data then focuses on corners and parcels and adds a third dataset—blocks—that is widely used as cadastral reference.

Datasets Included in This Data Theme

In the context of the National GIS, the Cadastral data theme is defined to include those geographic entities that are explicitly designated for the management of parcels and the parcel framework.

Dataset	Feature Type(s)
Corners	
Parcel Framework	
Boundaries	
Parcels	
Blocks	
Ownership/Surface Management Agency	
Regulated Use	Historic District
	Redevelopment Zone
	Enterprise Zone
	Greenway
	Wellhead Protection District
	Watershed Protection District
	Drainage Basin District
	Environmental Protection District
	Extra Territorial District
	Geologic Development Constraint

Related Tables

The following related tables are included in the Cadastral data theme:

Table Name
CornerType
MonumentType
CornerCoordinate

Valid Value Domains

The following valid value domains are included in the Cadastral data theme:

Valid Value Domain
CornerType
ElevationUnits
MonumentType
OwnerType
RegulatedUseCode

Views of This Data Theme

The cadastral dataset has widely varying views and uses at different levels of geography. These variations are outlined in the following sections.

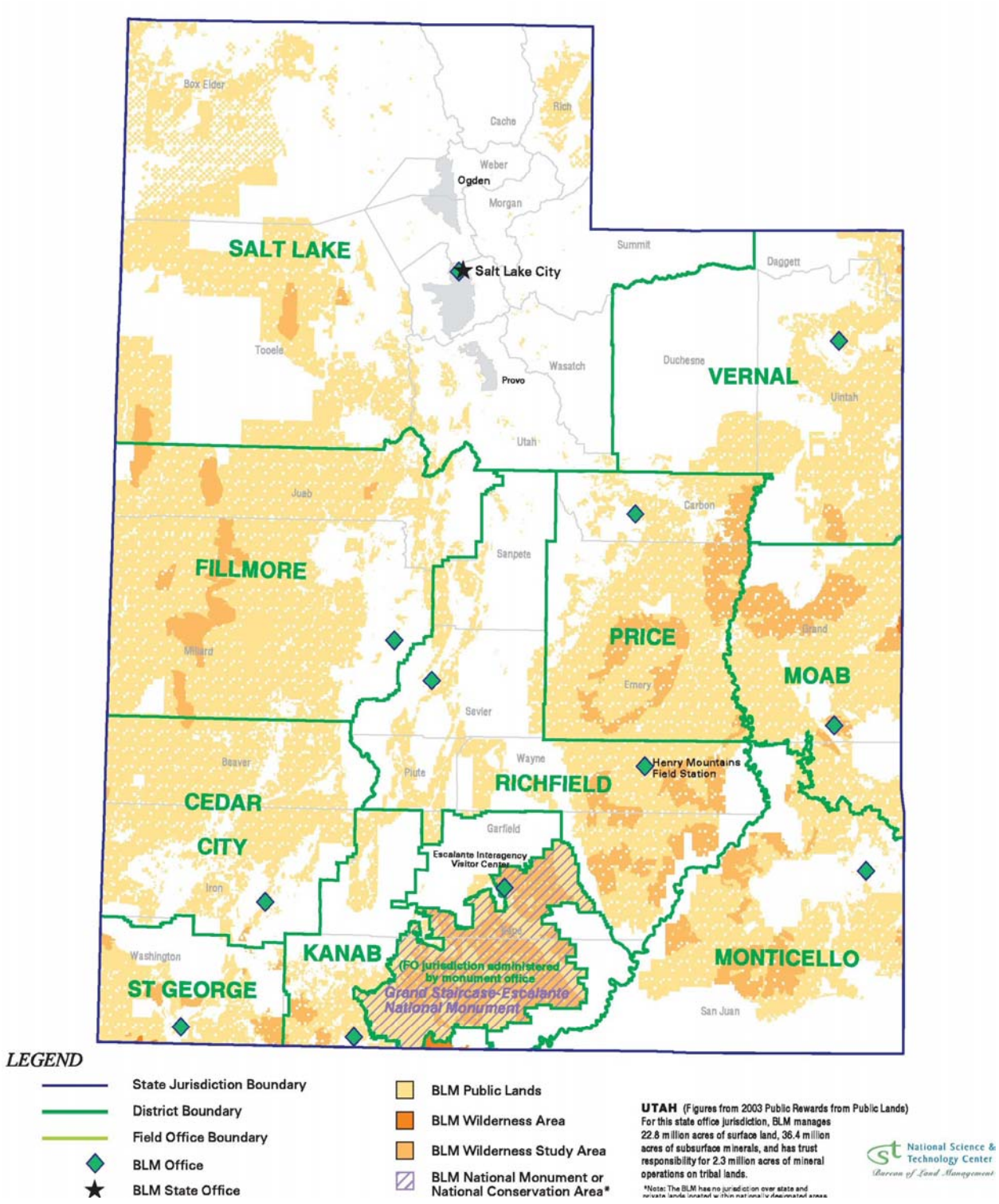
State and National Level View

At the national and state levels, cadastral data is usually used in aggregated forms. In other words, rather than individual parcels, rights-of-way or blocks being displayed, aggregations of these features symbolized on one or more of their attributes are of interest.

The example of the national and state view below shows the Bureau of Land Management (BLM) Administrative Jurisdictions classification for the state of Utah. The outlined polygons reflect the administrative jurisdiction boundaries and names. The colored polygons represent the different BLM public land parcel classification. The categories represented in the map include Public Lands, Wilderness Areas, Wilderness Study Areas, and National Monument or Conservation Areas. The remaining areas in white are privately owned land.

For the national and state view, the thematic classification of cadastral data is often times supplemented with reference information such as major highways, major hydrography, county boundaries, and selected cities information.

BLM Administrative Jurisdictions for Utah



Source: BLM Public Lands and Administrative Jurisdictions
http://www.blm.gov/nstc/jurisdictions/

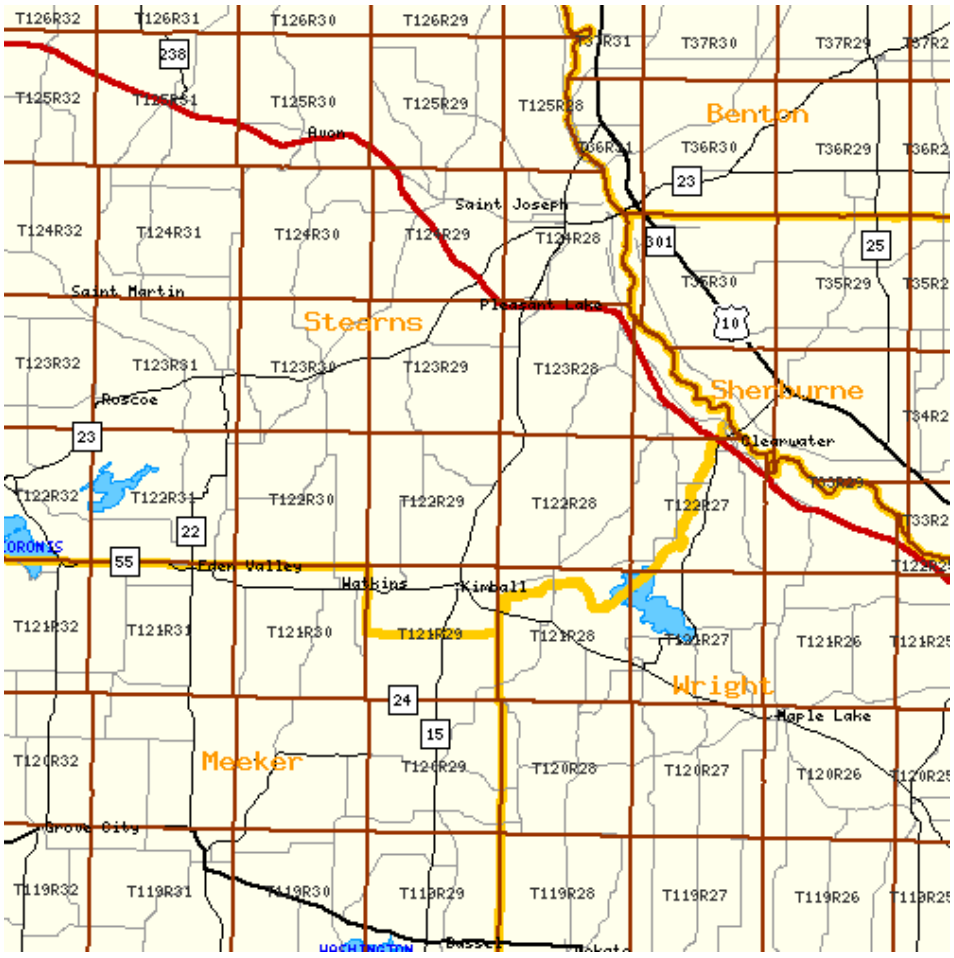
Regional and County Level View

Cadastral framework data such as the Public Land Survey System (PLSS) is often used at the regional and county levels. Parcel data is also used in aggregated forms to show ownership, land use, and other land classifications.

In the example below, which represents a regional area in the Midwest, the main theme is the parcel framework in the form of the PLSS townships and their names. This map provides context for the PLSS framework in this area. Supporting information includes county boundaries and names, major highways, hydrography, and selected cities and towns.

Approach

Parcel Framework—Public Land Survey System



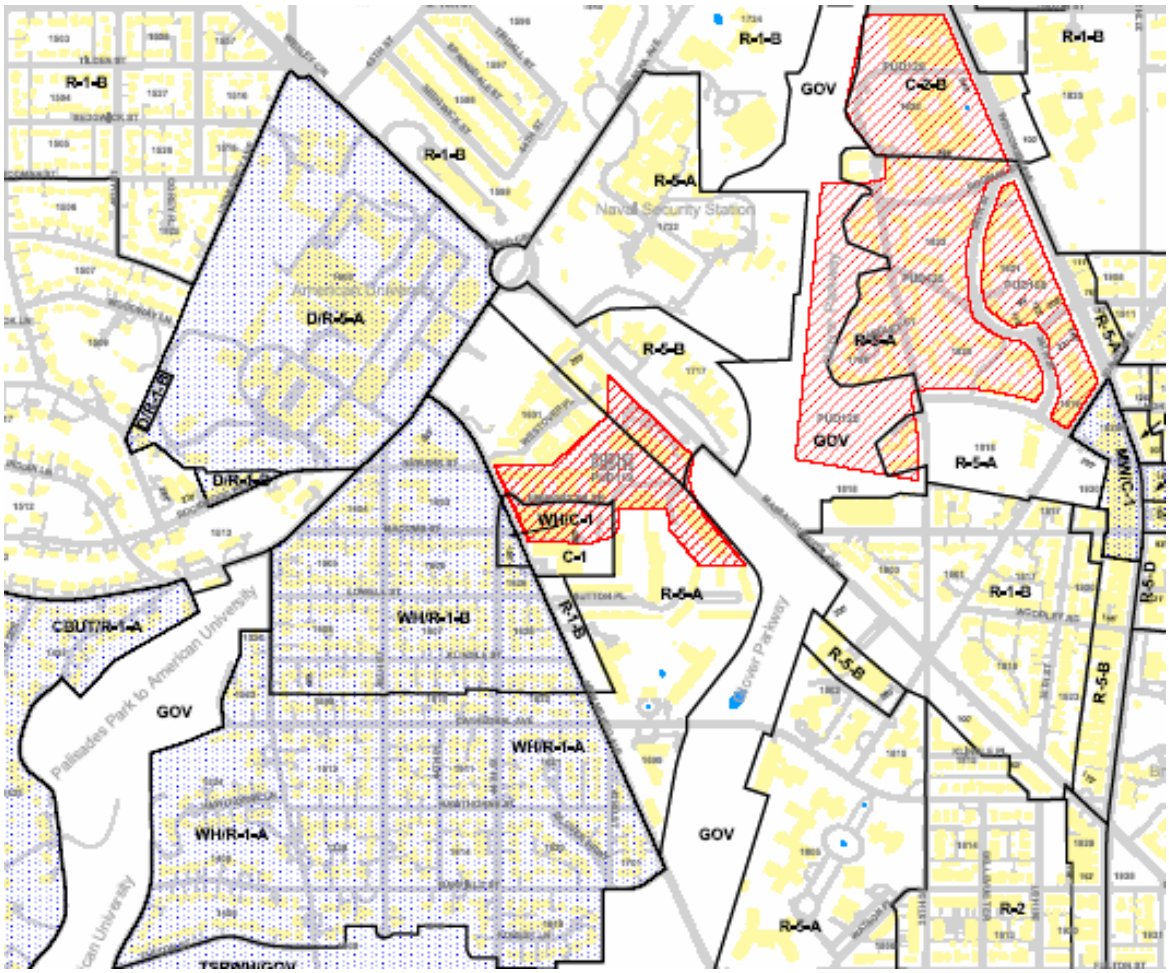
Source: State of Minnesota Land Management Information Center

City Level View

Cadastral data at the city level is able to show increasing detail, although the data still often shows aggregations of parcels. The city level view is often used to show regulated uses such as zoning, land use, and controls. These are aggregates of individual parcels based on attributes of the parcels.

The sample zoning map shown below clearly emphasizes zoning as the theme using a symbology scheme that includes zoning codes and polygon symbolization using color and shading. The base map used as reference includes rights-of-way, building footprints, street names, hydrography, and landmark names.

Zoning Map (Regulated Uses)



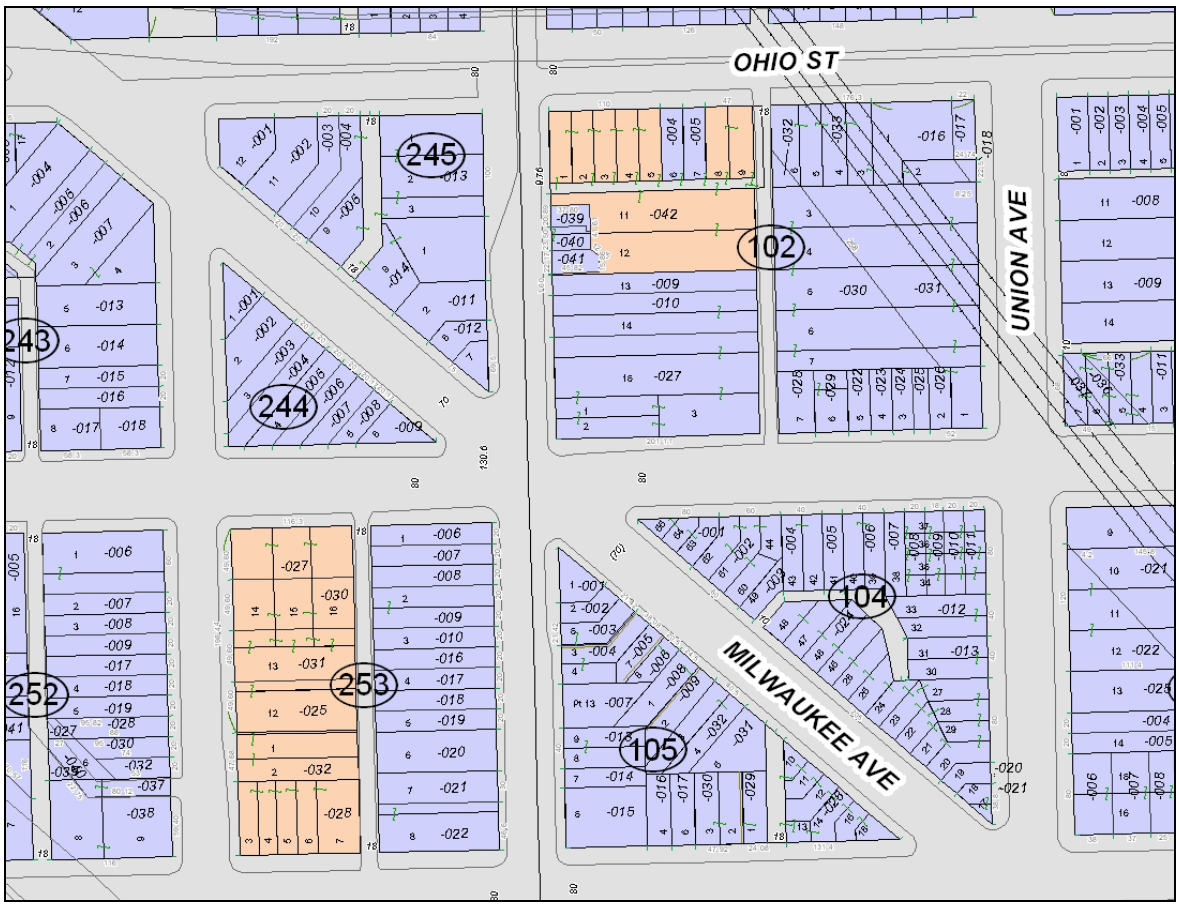
Source: District of Columbia Office of Zoning

Neighborhood Level View

Parcel mapping or tax mapping typically occurs at the neighborhood or local level. The amount of detail associated with parcels can be extensive and can only be represented effectively at larger scales as in the example below. Neighborhood level maps often include a variety of basemap layers to provide context for the cadastral data.

The sample below includes a variety of features associated with tax parcels. These include the parcel number (representing a portion of the unique parcel identifier), lot numbers, road and railroad rights-of-way and associated dimensions, block numbers, parcel hooks, and parcel dimensions. Street names provide important reference information.

Parcel Map with Typical Parcel Detail



Source: Cook County, Illinois

Dataset Specification for Corners

Description

Corners are point features that constitute a basic element of the framework for land records. Corners are represented by monuments, which are the physical markers for rights and interest in land, and are basic references in legal descriptions and surveys.

The FGDC Cadastral Subcommittee has identified corners of common usage as one of its cadastral core elements. As described in the FGDC Cadastral Core Data (Version 7) document (page 4):

> These [corners] might be points of commencing, corners common to several land divisions, or corners of the Public Land Survey System. There may be road intersections, control monuments, or corners of municipal boundaries that are used commonly as a starting point for land descriptions. Each jurisdiction that collects and maintains cadastral information would need to identify what they would consider to be corners of common usage. Generally, these corners would be at one to two mile spacing in rural areas and block-by-block to one-half mile to spacing in urban areas. Corners of common usage are also often used in other themes to control those themes such as political boundaries.

PLSS corners comprise a subset of the corners dataset. They are designed to store information pertaining to the exterior points of the PLSS. PLSS corners are legal locations that mark boundaries of a parcel or a parcel framework polygon.

Uses of the Data

Corners are typically used for defining parcel or parcel framework boundaries. Parcels are spatial extents constructed from various types of corners and boundaries and are formed by connecting corners.

Extent	Sample Usage	Spatial Representation
State/National	PLSS Reference Maps	Point
Regional/County	Parcel Framework	Point
City	Parcel Maps	Point
Neighborhood	Construction Plans	Point

Access Control Considerations

Corners data that is collected by government agencies is in the public domain, as is corners data collected by private firms that is published. No special considerations are required.

Recommended Attributes

The recommended attributes for the corners dataset are consistent with the FGDC cadastral core recommendations.

Name	Field Type	Domain	Definition
ControlID	String		Permanent unique feature identifier
CornerType	String	CornerType	Type of PLSS corner

Name	Field Type	Domain	Definition
CornerLabel	String		A name describing the legal location
CornerLocalLabel	String		Alternative name or label for the corner
Elevation	Float		Elevation of corner point
MonumentType	String	MonumentType	Type of PLSS corner
MonumentSurveyor	String		Surveyor or agency who set monument
MonumentDate	Date		Date monument was established
CoordinateSurveyor	String		Surveyor who established coordinate positions of the monument
CoordinateDate	Date		Date coordinate values were established
CoordinateSystem	String		Coordinate system for the coordinate values
ElevationUnits	String	ElevationUnits	Units of measure for the elevation
HorizontalDatum	String		Horizontal datum for the coordinate
VerticalDatum	String		Vertical datum for the coordinate
HorizontalAccuracy	String		Horizontal accuracy of the coordinate position
VerticalAccuracy	String		Vertical accuracy of the coordinate position

Related Tables

The corners dataset may be associated with related tables containing additional information about the monument and coordinate positions.

Monument

Attribute	Description
CornerPointID	Permanent unique feature identifier
ContolID	Pointer to identify corner monument
MonumentType	Describes the material, composition, and other characteristics of the physical corner marker
MonumentDateSet	The date the monument was set
CPSourceIndex	Value assigned to a monument record file to identify the record where information about the monument is kept
CPSourceType	The type of source for the monument information
CornerPointStatus	Describes the monument's relationship to other monuments at the same corner

CornerCoordinate

Attribute	Description
CornerCoordinateID	Permanent unique feature identifier
CornerPointID	Pointer to monument represented by coordinate
XCoordinate	X coordinate value or easting for a coordinate set
YCoordinate	Y coordinate value or northing for a coordinate set
ZCoordinate	Z coordinate value or elevation
CoordinateValue	Indicates whether the coordinate was obtained as part of a legal description
CoordinateStatus	Reference frame for linear or angular quantities
CSourceIndex	A coordinate value to file or identify the adjustment or survey from which the coordinate value originated
CSourceType	The type of source for the coordinate information
CSourceComments	Any additional notes or information about the methods used to obtain a measurement or the accuracy of the resulting measurements
Reliability	Measure of the total accuracy of coordinate value
AccuracyComments	Any statements about accuracy of coordinate value
CoordinateMethod	Technology used to establish coordinate value
CoordinateProcedure	Procedure using methods to measure coordinate value

Relationships

Corners can have a one-to-many relationship with monuments. A corner can be related to many monuments for a number of reasons including various legal interpretations of corner evidence and variations in monumentation over time. Corners can also have one-to-many relationships with corner coordinates when there have been multiple surveys or adjustments.

Dataset 1	Dataset 2	Cardinality
Corners	Monument	1:M
Monument	CornerCoordinates	1:M

Attribute Integrity—Valid Value Domains

CornerType

Code	Description
AC	Aliquot Part
AMC	Aux Meander Corner
AP	Angle Point
CAC	Closing Aliquot Part
CCC	Crossing Closing Corner
CQC	Closing Quarter Corner
CSC	Closing Section Corner
IP	Intersection Point
LC	Location Corner

Code	Description
LM	Location Monument
MC	Meander Corner
MP	Mile Post/Mile Corner
POL	Point on Line
QC	Quarter Corner
SC	Section Corner
SMC	Special Meander Corner
TC	Township Corner
WP	Witness Point
CS	Center of Section
CTC	Closing Township Corner
O	Other
U	Unknown

Security_Code
Please see the Metadata—Security and Access Control design pattern for more information.

Spatial Integrity—Topology
Corners are the basic element of the land records foundation. As such, the other features in the Cadastral data theme, as well as some features in other data themes, are constructed from corners.

Data Capture Specifications
Responsibility for collection and maintenance of corners typically rests with counties. The primary aspects of custodianship of corners are locating corners and upgrading or maintaining monumentation. Since most section corners have long been established, the focus of the data capture specifications is on improving the accuracy and monumentation of corners. This often involves resurveys using modern equipment in conjunction with available historical field notes.

Data Capture Criteria
Ideally, all corners within a jurisdiction (county) will be upgraded to improve their accuracy and establish modern monumentation. Corners may be prioritized in cases where funding limitations prohibit upgrading all corners.

Data Capture Guidance
The following guidelines are suggested for improving corners.

- Establish the basic corner framework using existing data such as the Geographic Coordinate Database (GCDB) from BLM, where available, digital line graph (DLG) PLSS data from United States Geological Survey (USGS), or other local sources in non-PLSS areas.
- Acquire federal government survey records for the original survey and any resurveys and assess the accuracy of these records to weight their importance.
- Determine adjusted coordinates by performing an adjustment of the data on a limited basis (township).
- Identify corners to be enhanced through new GPS surveys.
- Locate and flag corners identified for enhancement prior to the GPS crew's arrival.

- Collect GPS data in the field according to published guidelines from the National Geodetic Survey or BLM.
- Perform processing of the GPS data collected in the field.
- Recompute corners using the newly established GPS corners as control.

Accuracy Considerations

Accuracy standards for cadastral surveys have been put forth in the BLM publication entitled *Standards and Guidelines for Cadastral Surveys Using Global Positioning System Methods*. The following guidelines concerning the two primary types of accuracy, local and network, are taken from this publication (Attachment, pages 1–4).

> **Local Accuracy** is an average measure (e.g., mean, median, etc.) of the relative accuracies of the coordinates for a point with respect to other adjacent points at the 95 percent confidence level.
>
> **Network Accuracy** of all cadastral measurements should be reported per the FGDC Geospatial Positioning Accuracy Standards to show the relationship of the cadastral survey relative to the National Spatial Reference System.
>
> A least squares adjustment or other multiple baseline data analysis is performed to produce a weighted mean average to verify the required level of positional accuracy has been achieved.

The specific accuracy values provided in the document are based on the use of GPS to capture the coordinates.

Local Accuracy Standards

Application	95 Percent Confidence Circle
Cadastral Project Control	Less than 0.050 meters
Cadastral Measurements	Less than 0.100 meters

Network Accuracy Standards

Application	95 Percent Confidence Circle
Cadastral Project Control	Less than 0.100 meters
Cadastral Measurements	Less than 0.200 meters

Update Strategy

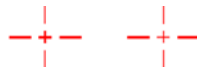
The maintenance process for corners is ongoing and iterative. Many corners have been undergoing extensive maintenance and updating in recent years, driven in large part by the availability of high accuracy GPS technology, integration of survey data with GIS, and a concern on the part of data users for better accuracy. Maintenance and improvement of corner coordinates is a concern of federal agencies such as BLM as well as state, county, and municipal governments.

As new surveys are performed, they provide input into the process of refining the coordinates of corners and features that are based on them such as PLSS boundaries, subdivisions, and parcels. The National Integrated Land System (NILS) is a project undertaken by BLM, in partnership with state and local governments and private industry, to modernize the management of land records and provide a field to fabric solution for land management based on GIS.

Map Layer Specifications

Symbolization of the corners dataset varies depending on map scale and extent and the purpose of the map. Symbolization for typical uses is summarized in the following table.

Common Symbology

Type of Corner	Symbology
Section Corner	
Closing Corner	
Witness Corner— Meander Corner	

Spatial Representation	Extent	Sample Usage	Symbology
Point	Regional/County	Parcel Framework	
Point	City	Parcel Maps	
Point	Neighborhood	Construction Plans	

Annotation

Spatial Representation	Extent	Annotation Attributes
PLSS Corner, Other Corners	State/National	Point ID
PLSS Corner, Other Corners	Regional/County	Corner Type
PLSS Corner, Other Corners	City	Corner Type
PLSS Corner, Other Corners	Neighborhood	Corner Type

References

Bureau of Land Management. Standards and Guidelines for Cadastral Surveys Using Global Positioning System Methods. May 2001.

Cone, Leslie, and Bjornsson, Carsten. Modernizing and Maintaining the Public Land Surveying System (PLSS). American Conference on Surveying and Mapping, 2005 Conference.

Federal Geographic Data Committee (FGDC) Cadastral Subcommittee. Cadastral Core Data Version 7, June 2005: http://www.nationalcad.org/data/documents/Cadastral%20Core%20Data%20Verison%207.pdf

von Meyer, Nancy. *GIS and Land Records: The ArcGIS Parcel Data Model*. ESRI Press, 2004.

Arctur, David, and Zeiler, Michael. *Designing Geodatabases: Case Studies in GIS Data Modeling*. ESRI Press, 2004.

Dataset Specification for Parcel Framework

Description

Parcel frameworks are the areal structures used for parcel mapping. Parcel frameworks are designed to store information pertaining to a hierarchical group of feature classes that define land descriptions. Together, these features form a parcel framework used to construct parcels. They are based on corners and boundaries and, in turn, are the structural basis for individual parcels such as tax and ownership parcels.

The FGDC Cadastral Subcommittee has identified cadastral reference as one if its cadastral core data categories. As described in the FGDC Cadastral Core Data (Version 7) document (page 3):

> The cadastral reference is the information necessary to fit the parcel information into a continuous and related fabric. In the public domain states, the PLSS is a key component of the cadastral reference. In nonpublic domain states and in the PLSS states, there are other cadastral reference systems that form a hierarchy for parcel information and define a cadastral reference. This includes municipal boundaries, roads, hydrography, subdivision plat boundaries and blocks, and lots.

Further, the FGDC describes the Significant Cadastral Reference Features in the FGDC Cadastral Core Data (Version 7) document (page 5–6) as:

> […] areas and features that define the primary levels of nested legal descriptions. As examples, this might be the Public Land Survey System components, the exterior boundaries of subdivisions, or the boundaries of large public land holdings. It is expected that these features will not cover the entire jurisdiction but will be important features for understanding and using parcel information.

As stated, there are many types of parcel frameworks; the two described here are simultaneous conveyances and PLSS townships. Although similar, these parcel frameworks are modeled separately due to unique rules required by each.

The simultaneous conveyance parcel framework includes the following feature classes: simultaneous conveyance, simultaneous conveyance first division, and simultaneous conveyance second division. The simultaneous conveyance feature class represents the exterior boundary of a conveyance. It is senior to the interior simultaneous conveyance first division, which is senior to the simultaneous conveyance second division. Simultaneous conveyances are created from a legal instrument; several parcels are created as a result.

The PLSS township parcel framework includes the following feature classes: PLSS township, PLSS first division (sections), PLSS second division (quarter sections), and PLSS third division (quarter-quarter/aliquot). PLSS land descriptions are the spatial basis for managing activities on federal lands. The BLM is the federal agency responsible for PLSS surveys to be used in the management of federal land and resources.

Uses of the Data

PLSS is typically used for subdividing land via surveys to smaller and smaller building blocks for land and resource management.

References

www.blm.gov

http://nationalatlas.gov/articles/boundaries/a_plss.html#one

von Meyer, Nancy. *GIS and Land Records: The ArcGIS Parcel Data Model*. ESRI Press, 2004.

Arctur, David, and Zeiler, Michael. *Designing Geodatabases: Case Studies in GIS Data Modeling.* ESRI Press, 2004.

Federal Geographic Data Committee (FGDC) Cadastral Subcommittee. Cadastral Core Data Version 7, June 2005: http://www.nationalcad.org/data/documents/Cadastral%20Core%20Data%20Verison%207.pdf

Dataset Specification for Boundaries

Description

The boundaries dataset is designed to store information pertaining to exterior lines that are the boundaries of parcels or parcel framework. Boundaries are typically generated from surveys or coordinate geometry. Boundaries can be created at the federal or local levels.

Uses of the Data

The boundaries dataset is typically used for constructing parcels or a parcel framework. It also includes subdivision boundaries.

Extent	Sample Usage	Spatial Representation
State/National	Survey Plats	Line
Regional/County	Survey Plats	Line
City	Subdivision Plats, Survey Plats	Line
Neighborhood	Subdivision Plats, Survey Plats	Line

References

http://nationalatlas.gov/articles/boundaries/a_plss.html

http://www.fairview-industries.com/gismodule/PartOnePLSSDatum.html

von Meyer, Nancy. *GIS and Land Records: The ArcGIS Parcel Data Model*. ESRI Press, 2004.

Arctur, David, and Zeiler, Michael. *Designing Geodatabases: Case Studies in GIS Data Modeling.* ESRI Press, 2004.

Dataset Specification for Parcels

Description

The parcels dataset is designed to store information pertaining to parcel ownership and related rights and interests. For example, a type of parcel is the tax parcel used for jurisdictional taxing and land management. Boundaries of parcels are defined in legal documents, such as deeds, from a legal description based on a Parcel Framework. Other polygons, such as related use polygons like tax districts, may be derived from parcels. In addition, a parcel may have subparcel features such as buildings.

The FGDC Cadastral Subcommittee has identified parcels as core parcel information. As described in the FGDC Cadastral Core Data (Version 7) document (page 3):

> The core elements have been defined to support navigation and discovery of parcel information, emergency planning and initial response, economic development, and community planning. Additional detail about parcels can be found through linkages to data producers.

Parcels in the GIS can be constructed from digitizing scanned maps, coordinate geometry descriptions, legal descriptions, or directly from survey data. The parcels dataset is a polygon feature class with related tax roll and condominium record information.

Uses of the Data

The parcels dataset is typically used for tax assessments and land management. Parcels are also used in variety of other uses such as planning and zoning.

Extent	Sample Usage	Spatial Representation
State/National		Polygon
Regional/County	Planning Maps	Polygon
City	Subdivision Plats	Polygon
Neighborhood	Tax Maps, Parcel Maps	Polygon

Access Control Considerations

Parcel data has some sensitivity because of the personal information associated with it, particularly owner names and property valuation. Measures need to be taken to safeguard this information.

Recommended Attributes

Name	Field Type	Domain	Definition
Parcel ID	String		A unique parcel identifier for the parcel as defined by the jurisdiction
Source Reference	String		Description of the source reference for the parcel
Source Reference Data	String		Last update date for the parcel
Owner Type	String	OwnerType	Owner type is the classification of the owner

Name	Field Type	Domain	Definition
Improved	String		Whether or not the parcel has an improvement
Owner Name	String		Primary owner name For federal lands, name will be surface management agency
Assessment Value	Long Integer		Total value of the land
Assessment Value of Improvements	Long Integer		Total value of the improvements of the parcel
Assessment Value Total	Long Integer		Total value of land and improvements
Primary Assessment	Long Integer		Assessment or tax classification of the parcel
Secondary Assessment	Long Integer		Include all assessment or tax classifications of the parcel
Tax Bill Mailing Address	String		U.S. postal service address for tax bill mailing. See Address data theme
Parcel Area	Double		Parcel area in acres
Parcel Zoning	String		Current land use zoning classification
Public Parcel Name	String		Commonly recognized name of publicly owned parcels
Land Use Code	String		Land use classification code (see Land Use/Land Cover data theme)

`Related Tables

The parcels dataset is associated with the Address data theme. Tax parcels are also typically related to tax rolls, but these data are not typically shared beyond local jurisdictions and not specified in this model.

Relationships

The following relationships apply for parcels. A parcel can have a one-to-many relationship with the tax roll if there is more than one owner. A tax parcel may have a one-to-many relationship with multiunit dwellings such as condominiums. Further, each unit of the multiunit dwelling could have a one-to-many relationship with the tax roll if there is more than one owner.

Attribute Integrity—Valid Value Domains

OwnerType

Code	Description
International	International
Tribal	Tribal
Federal	Federal
State	State
County	County
Local/Municipal	Local/Municipal
Private	Private
Not for Profit	Not for Profit
Other	Other
Unknown	Unknown
Taxable	Taxable (may be used in local government if owner classification is not known)
Exempt	Exempt (may be used in local government if owner classification is not known)

Security_Code
Please see the Metadata—Security and Access Control design pattern for more information.

Spatial Integrity—Topology

Parcels must be spatial integrated with several underlying datasets. The corners and parcel framework datasets form the basic framework upon which parcels are created. Therefore, parcels must be spatially consistent with these underlying datasets.

In addition, parcels are often formed by natural features, particularly hydrography, and should be spatially consistent with these features. However, corners and parcel framework datasets often override natural features as parcel boundaries.

Data Capture Specifications

Parcels are a fundamental component of many local government geospatial databases and are often used as base map data to which other datasets are referenced. In most of the United States, development of parcel databases is performed at the county level in support of the counties' property valuation and tax collection responsibilities. Frequently, parcel data is shared by a county and a large city within the county, although the authoritative parcel database is maintained by the county.

Data Capture Criteria
Parcels are often the focus of local government efforts to capture parcels. Therefore, tax parcels are the focus of the discussion below.

The capture criteria for tax parcels is relatively straightforward. Ideally, a county tax parcel database comprises a continuous fabric consisting of all taxable properties and rights-of-way. All land area within the jurisdiction should be included as either a parcel or right-of-way. In some cases where the parcels are of primary interest or where funding constraints are in effect, the database may not include right-of-way features. However, if at all

possible, it is highly desirable that a continuous and all-inclusive tax parcel dataset be created during the database development process.

Data Capture Guidance

This section begins with an outline of the major approaches to developing tax parcel databases and identifies the advantages and disadvantages associated with each. Following this overview of methodologies, specific guidance is provided.

A variety of data capture methodologies have been used to build tax parcel databases. The choice of methodology depends on many factors including funding availability, planned usage of the data, accuracy requirements, time constraints, and technical considerations. These approaches have been consolidated into four main types, which are summarized in the table below in order of highest accuracy and cost to lowest.

Methodology	Advantages	Disadvantages
Measurement-Based Cadastre	• Survey level accuracy supports rigorous uses of the data; parcel fabric is linked to survey data • Accuracy is consistent across the database and can be documented • Supports accurate area and distance calculations • Provides an ideal base map for other spatial features • Very close fit with digital orthoimagery	• Most expensive methodology, often prohibitively expensive for local governments • Most time consuming approach and may take longer to complete depending on resource availability • Requires higher level of technical knowledge including surveying expertise • Accuracy of original data will be degraded if not maintained with current surveys
Construction Using Coordinate Geometry (COGO)	• Survey level accuracy supports rigorous uses of the data • Accuracy is consistent across the database and can be documented • Supports accurate area and distance calculations • Provides an ideal base map for other spatial features • Very close fit with digital orthoimagery	• Often prohibitively expensive for local governments • Most time consuming approach and may take longer to complete depending on resource availability • Requires higher level of technical knowledge including surveying expertise • Accuracy of original data will be degraded if not maintained with COGO

Methodology	Advantages	Disadvantages
Construction and Best Fit to Base Map	• Less accurate than COGO but uses dimensions to construct parcel data • Suitable for most assessment uses • Uses digital orthoimagery for control • Accuracy can be maintained and documented • Supports approximate area and distance calculations • Provides reasonable base map for other spatial features	• Good cost compromise between COGO and other methods • Required level of technical knowledge is moderate; survey expertise not required • Maintenance requirements less rigorous than for COGO approach; however, data accuracy can be improved over time by maintaining with COGO
Digitizing and Best Fit to Base Map	• Least accurate but still suitable for most assessment uses • Uses digital orthoimagery for control • Accuracy is not consistent and is difficult to document • Not suitable for area or distance calculations • Can provide sufficient base map for other spatial features	• Least costly of the three methods • Required level of technical knowledge is moderate; most data conversion vendors or in house staff have needed capabilities • Maintenance requirements less rigorous than the other two approaches • Data accuracy can be improved during maintenance

A fifth methodology, creation of raster tax parcel databases, has been used where funding to convert the data to vector form is not available. This approach is viable as an interim step in developing tax parcel data but has significant shortcomings in the context of the National GIS and is not addressed here.

The following specific guidelines are provided for capture of tax parcel data.

- The data capture methodology should achieve a level of positional accuracy such that the data is consistent with digital orthoimagery within 3–5 feet in built-up areas.
- Parcels and rights-of-way should be captured as inclusive nonoverlapping polygons.
- Each parcel polygon must have a unique identifier, typically the parcel identification number (PIN) used by the assessor to uniquely identify the parcel and link to assessment and ownership data.
- The parcel ID should be included as annotation positioned within the parcel.
- Situs address information associated with the parcel should be included as an attribute. Owner address information is desirable but not required.
- Right-of-way polygons should contain attributes and/or annotation indicating the type of right-of-way and, if applicable, its owner (e.g., railroad rights-of-way).
- Parcels that represent multiple units, such as condominiums, should include basic attribute information for these units. Specifically, a unit identifier should be included.

Accuracy Considerations

Accuracy standards for cadastral surveys have been put forth in the BLM publication entitled *Standards and Guidelines for Cadastral Surveys Using Global Positioning System Methods*.

These have been presented earlier in this document under Data Capture Specifications for PLSS Corners.

As a practical matter, tax parcel databases for local governments typically do not require survey level accuracy, nor is this level of accuracy necessary in the context of the National GIS. Because the accuracy of tax parcel data coming from local governments will vary from county to county, the role of metadata is essential in documenting the data.

Update Strategy

It is a fundamental principle of tax parcel databases that they are subject to continuous change. Most jurisdictions that have implemented GIS for managing their tax parcel databases perform maintenance on an ongoing basis to ensure currency of the data. As such, it can be expected that the parcel dataset will, in most cases, be relatively current.

Map Layer Specifications

The parcel dataset is a relatively dense data dataset that is typically displayed or plotted as polygons at large scales.

Common Symbology

Spatial Representation	Extent	Sample Usage	Symbology
Parcels Classified by Type	City	Planning Maps	
Parcels and Associated Features	Neighborhood	Tax Map	

Annotation

Spatial Representation	Extent	Sample Usage	Annotation Attributes
Parcels	Neighborhood	Tax Map	ParcelID, Parcel Dimensions, Block

References

Bureau of Land Management. Standards and Guidelines for Cadastral Surveys Using Global Positioning System Methods. May 2001.

Cone, Leslie, and Bjornsson, Carsten. Modernizing and Maintaining the Public Land Surveying System (PLSS). American Conference on Surveying and Mapping, 2005 Conference.

Federal Geographic Data Committee (FGDC) Cadastral Subcommittee. Cadastral Core Data Version 7. June 2005: http://www.nationalcad.org/data/documents/Cadastral%20Core%20Data%20Verison%207.pdf

von Meyer, Nancy. *GIS and Land Records: The ArcGIS Parcel Data Model*. ESRI Press, 2004.

Dataset Specification for Blocks

Description

The blocks dataset is a specific case of parcel framework that is widely used in parcel mapping and as part of base maps at the local level. In the context of the Bluebook data model, blocks are defined as the areas resulting from dissolving groups of contiguous parcel polygons. These polygons, combined with the right-of-way, provide a useful base map reference.

Uses of the Data

The blocks dataset is typically used to depict the boundary between parcels and rights-of-way. In built-up areas, blocks will often approximate the edge of pavement or curb line, although normally a difference of several feet would be expected between them for sidewalks and parkways.

Extent	Sample Usage	Spatial Representation
State/National		Not Applicable
Regional/County	Planning Maps	Polygon
City	Parcel Maps, Zoning Maps	Polygon
Neighborhood	Parcel Maps, Planning Maps	Polygon

Access Control Considerations

Blocks are public domain information.

Recommended Attributes

Name	Field Type	Domain	Definition
BlockNumber	Integer		Block number in local usage

Related Tables

The blocks dataset has no related tables.

Attribute Integrity—Valid Value Domains

Security_Code

Please see the Metadata—Security and Access Control design pattern for more information.

Spatial Integrity—Topology

Since blocks are derived from parcels, their boundaries will be coincident with portions of the parcel boundaries representing the outside of a block.

Block boundaries are also coincident with right-of-way boundaries.

Data Capture Specifications

Data Capture Criteria

Blocks are derived from parcel and right-of-way geometry by taking the union of (dissolving) groups of contiguous parcels.

Data Capture Guidance

Ideally, the creation of block data is an automated process that can be performed by a GIS using the parcels and rights-of-way as inputs.

Blocks can also be created through digitizing the block boundaries directly from parcel or other maps, but this approach should only be used when parcels are not available.

Accuracy Considerations

The accuracy of a block dataset developed from parcel data will have the same accuracy as the input parcel data.

Update Strategy

Block data can change as a result of changes in the parcel and right-of-way fabric such as dedications and vacations. Blocks managed in a GIS, in conjunction with parcels and rights-of-way, can be kept current by simultaneous editing of the parcels and rights-of-way.

Map Layer Specifications

Common Symbology

Spatial Representation	Extent	Sample Usage	Symbology
Polygon	City	Planning Maps	
Polygon	Neighborhood	Tax Map	

Annotation

Spatial Representation	Extent	Sample Usage	Annotation Attributes
Block	Neighborhood	Parcel Map	BlockNumber

Dataset Specification for Ownership/Surface Management Agency

Description

The ownership/surface management agency dataset is designed to store information pertaining to the ownership and management of federal lands. Ownership and surface management agency may vary slightly because the managing agency may not own the land and/or the rights and interest in the land. The ownership/surface management dataset is a polygon feature class used in federal resource and land management. BLM is the federal agency responsible for maintaining the ownership/surface management agency dataset.

Uses of the Data

The ownership/surface management agency is typically used for managing federal land and resources.

Extent	Sample Usage	Spatial Representation
State/National	Federal Land Ownership Map	Polygon
Regional/County	Regional Maps of Land Ownership	Polygon
City	City Maps of Land Ownership	Polygon
Neighborhood	Local Maps of Land Ownership	Polygon

References

http://www.blm.gov/nstc/jurisdictions/

Arctur, David, and Zeiler, Michael. *Designing Geodatabases: Case Studies in GIS Data Modeling*. ESRI Press, 2004.

Dataset Specification for Regulated Use

Description

The regulated use dataset is designed to store information pertaining to jurisdictional regulated uses, site addresses, and restrictions. The regulated use dataset is used by local jurisdictions for land management.

Uses of the Data

The regulated use dataset is typically used for local land management.

Extent	Sample Usage	Spatial Representation
Regional/County	Zoning Maps	Polygon
City	Zoning Maps	Polygon
Neighborhood	Zoning Maps	Polygon

Access Control Considerations

No special considerations are required.

Recommended Attributes

Name	Field Type	Domain	Definition
PermenentIdentifier	UUID		Permanent unique feature identifier
RegulatedUseID	String		Internal ID
RegulatedUseCode	String	RegulatedUseCode	Type of regulated use
CurrentorProposed	String		Is the regulated use currently in place or proposed?

Related Tables

None

Relationships

Regulated uses should be vertically integrated with the parcel geometries from which they are constructed.

Attribute Integrity—Valid Value Domains

RegulatedUSeCode

Code	Description
1	Historic District
2	Redevelopment Zone
3	Enterprise Zone
4	Greenway
5	Wellhead Protection District
6	Watershed Protection District

Code	Description
7	Drainage Basin District
8	Environmental Protection District
9	Extra Territorial District
10	Geologic Development Constraint

Security_Code
Please see the Metadata—Security and Access Control design pattern for more information.

Spatial Integrity Rules

Regulated uses should be vertically integrated with the parcel geometries from which they are constructed.

References

von Meyer, Nancy. *GIS and Land Records: The ArcGIS Parcel Data Model*. ESRI Press, 2004.